

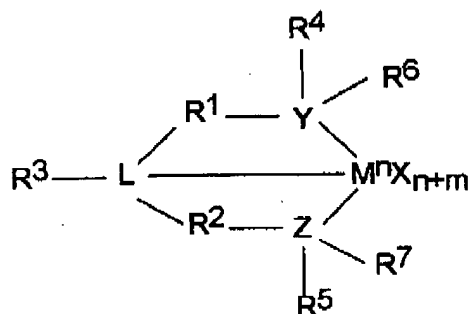
Application No.: 10/761,101
Response dated: March 30, 2006
Reply to Office Action: February 2, 2006

IN THE CLAIMS

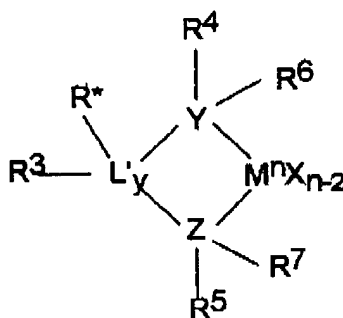
1. (Previously Presented) A process for polymerizing olefin(s) comprising combining said olefin(s), a catalyst composition having a first catalyst component comprising a Group 15 containing bidentate or tridentate ligated Group 3 to 7 metal compound wherein the Group 3 to 7 metal atom is bound to at least one leaving group and to at least two Group 15 atoms, and wherein at least one of the at least two Group 15 atoms is bound to a group 15 or 16 atom through a bridging group; and a second catalyst component, wherein said second catalyst component is a metallocene compound and wherein said first catalyst component and said second catalyst component are added to a polymerization reactor in one of a slurry, a dispersion or a suspension.
2. (Cancelled)
3. (Original) The process of claim 1 wherein metal in the Group 15 containing metal compound is a Group 4 to 6 metal compound.
4. (Original) The process of claim 1 wherein the bridging group is selected from the group consisting of a C₁ to C₂₀ hydrocarbon group, a heteroatom containing group, silicon, germanium, tin, lead, and phosphorus.
5. (Original) The process of claim 1 wherein the Group 15 or 16 atom may also be bound to nothing, a hydrogen, a Group 14 atom containing group, a halogen, or a heteroatom containing group, and wherein each of the two Group 15 atoms are also bound to a cyclic group and may optionally be bound to hydrogen, a halogen, a heteroatom or a hydrocarbyl group, or a heteroatom containing group.

Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006

6. (Previously Presented) The process of claim 1 wherein the Group 15 containing metal compound is represented by the formula:



or



wherein

M is a Group 3 to 7 metal,

each X is independently a leaving group

y is 0 or 1,

n is the oxidation state of M,

m is the formal charge of the Y, Z and L or the Y, Z and L',

L is a Group 15 or 16 element,

L' is a Group 15 or 16 element or Group 14 containing group,

Y is a Group 15 element,

Application No.: 10/761,101
Response dated: March 30, 2006
Reply to Office Action: February 2, 2006

Z is a Group 15 element,

R¹ and R² are independently a C₁ to C₂₀ hydrocarbon group, a heteroatom containing group having up to twenty carbon atoms, silicon, germanium, tin, lead, or phosphorus,

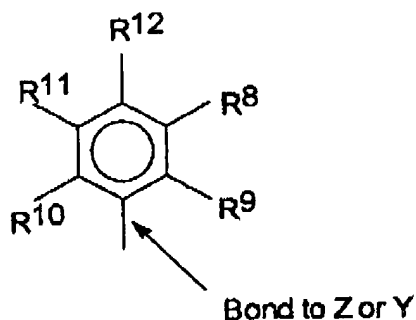
R³ is absent or a hydrocarbon group, hydrogen, a halogen, a heteroatom containing group,

R⁴ and R⁵ are independently an alkyl group, an aryl group, substituted aryl group, a cyclic alkyl group, a substituted cyclic alkyl group, a cyclic arylalkyl group, a substituted cyclic arylalkyl group or multiple ring system, interconnected to each other,

R⁶ and R⁷ are independently absent, or hydrogen, an alkyl group, halogen, heteroatom or a hydrocarbyl group, and

R⁸ is absent, or is hydrogen, a Group 14 atom containing group, a halogen, a heteroatom containing group.

7. (Original) The process of claim 6 wherein R⁴ and R⁵ are represented by the formula



Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006

wherein

R^8 to R^{12} are each independently hydrogen, a C_1 to C_{40} alkyl group, a halide, a heteroatom, a heteroatom containing group containing up to 40 carbon atoms, wherein any two R groups may form a cyclic group and/or a heterocyclic group, and wherein the cyclic groups may be aromatic.

8. (Previously Presented) The process of claim 7 wherein R^8 to R^{12} are independently a methyl, ethyl, propyl or butyl group.
9. (Previously Presented) The process of claim 8 wherein R^8 to R^{12} are methyl groups, [and R^8 and R^{11} are hydrogen].
10. (Original) The process of claim 9 wherein M is a Group 4 metal, L, Y, and Z are independently nitrogen, R^1 and R^2 are a hydrocarbon radical, R^3 is hydrogen, and R^6 and R^7 are absent.
11. (Original) The process of claim 9 wherein M is a Group 4 metal, L and Z are nitrogen, L' is a hydrocarbonyl radical, and R^6 and R^7 are absent.
12. (Currently Amended) The process of claim 1 wherein the second catalyst component comprises a metallocene compound of the general formula

$$L^A L^B [M'] MQ_n \text{ or } L^A AL^B [M'] MM' Q_n$$
 wherein $[M'] M$ is a Group 4, 5 or 6 metal atom,
 L^A and L^B are selected from the group consisting of cyclopentadienyl, tetrahydroindenyl, indenyl, fluorenyl, and substituted versions thereof, L^A and L^B are each bonded to $[M'] M$;
 each Q is a monoanionic leaving group,
 A is a divalent bridging group containing at least one Group 13 to Group 16 atom; and

Application No.: 10/761,101
Response dated: March 30, 2006
Reply to Office Action: February 2, 2006

n is 0, 1 or 2.

13. (Cancelled)
14. (Cancelled).
15. (Currently Amended) The process of claim 12 wherein $[M']_1M$ is a Group 4 metal.
16. (Cancelled)
17. (Previously Presented) The process of claim 1 wherein the catalyst composition further comprises an activator.
18. (Original) The process of claim 1 wherein the polymerization process is a continuous gas or slurry phase process.
19. (Original) The process of claim 1 wherein the olefin(s) are ethylene and one or more other olefin(s).
20. (Previously Presented) The process of claim 1 wherein said first catalyst component and said second catalyst component are present in a molar ratio of 1:99 to 99:1.
21. (Previously Presented) The process of claim 1 wherein said first catalyst component and said second catalyst component are present in a molar ratio of 20:80 to 80:20.

Application No.: 10/761,101
Response dated: March 30, 2006
Reply to Office Action: February 2, 2006

22. (New) The process of claim 1, wherein said first catalyst component comprises a tridentate ligated group, wherein said metallocene catalyst compound is represented by the formulae:



where M is a Group 4, 5, or 6 metal atom; L^A and L^B , comprise unsubstituted or substituted, cyclopentadienyl ligands or cyclopentadienyl-type ligands, heteroatom substituted and/or heteroatom containing cyclopentadienyl ligands bonded to M; L^A and L^B may be the same or different, L^A and L^B are each bonded to M; Q is a monoanionic ligand, n is 0, 1 or 2, such that formula (III) represents a neutral metallocene catalyst compound and wherein said process further comprises combining an activator selected from alumoxane, a modified alumoxane, non-coordinating ionic activators, non-coordinating neutral activators, and combinations thereof.

23. (New) The process of claim 22, wherein said process further comprises combining said catalysts and the activator on, depositing on, contacting with, incorporating within, adsorbing, or absorbing in, a support.
24. (New) The process of claim 12, wherein said activator is selected from alumoxane, modified methyl alumoxane, or combinations thereof, and said process further comprises combining said catalysts or the activator on, depositing on, contacting with, incorporating within, adsorbing, or absorbing in, a support.
25. (New) The process of claim 23, wherein said first catalyst component and said second catalyst component are combined with said activator prior to introduction into said polymerization reactor, wherein said olefin(s) comprise one or more of

Application No.: 10/761,101
Response dated: March 30, 2006
Reply to Office Action: February 2, 2006

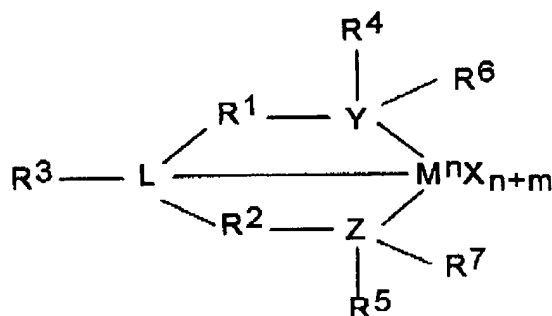
ethylene, propylene, butene-1, pentene-1, 4-methyl-pentene-1, hexene-1, octene-1, decene-1, 3-methyl-pentene-1, 3,5,5-trimethyl-hexene-1, or combinations thereof.

26. (New) The process of claim 24, wherein said first catalyst component and said second catalyst component are combined with said activator prior to introduction in to said polymerization reactor, wherein said olefin(s) comprise one or more of ethylene, propylene, butene-1, pentene-1, 4-methyl-pentene-1, hexene-1, octene-1, decene-1, 3-methyl-pentene-1, 3,5,5-trimethyl-hexene-1, or combinations thereof.
27. (New) The process of claim 23, wherein said olefin(s) comprise one or more of ethylene, propylene, butene-1, pentene-1, 4-methyl-pentene-1, hexene-1, octene-1, or combinations thereof, wherein the mole ratio of comonomer to ethylene, C_x/C_2 , where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between 0.001 - 0.0100.
28. (New) The process of claim 24, wherein said olefin(s) comprise one or more of ethylene, propylene, butene-1, pentene-1, 4-methyl-pentene-1, hexene-1, octene-1, or combinations thereof, wherein the mole ratio of comonomer to ethylene, C_x/C_2 , where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between 0.001 - 0.0100.
29. (New) The process of claim 23, wherein said olefin(s) comprise one or more of ethylene, butene-1, hexene-1, octene-1, or combinations thereof, wherein the mole ratio of comonomer to ethylene, C_x/C_2 , where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between 0.002 to 0.008.
30. (New) The process of claim 24, wherein said olefin(s) comprise one or more of ethylene, butene-1, hexene-1, octene-1, or combinations thereof, wherein the mole

Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006

ratio of comonomer to ethylene, C_x/C_2 , where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between 0.002 to 0.008.

31. (New) The process of claims 1, 9, or 22, wherein said first catalyst component is represented by the formulae:



where M is zirconium, each X is independently an alkyl leaving group, n is the oxidation state of M,

m is the formal charge of the ligand comprising Y, Z and L,

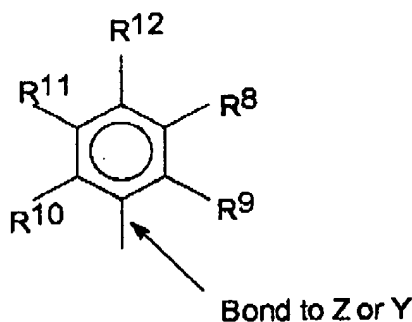
L, Y and Z are nitrogen,

R^1 and R^2 are independently $-\text{CH}_2-\text{CH}_2-$,

R^3 is hydrogen,

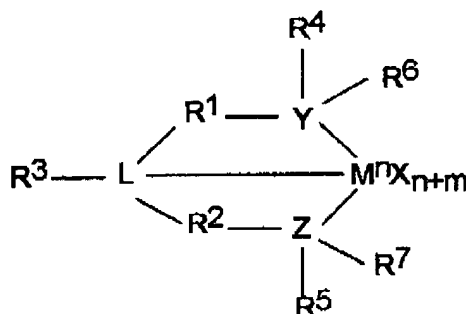
wherein R^4 and R^5 are represented by the formula

Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006



wherein
 R⁸ to R¹² are methyl groups; and
 R⁶ and R⁷ are absent.

32. (New) The process of claim 12, wherein said first catalyst component is represented by the formulae:



wherein

M is a Group 4 metal,

each X is independently a leaving group,

n is the oxidation state of M,

m is the formal charge of the ligand comprising Y, Z and L,

L is a Group 15 element,

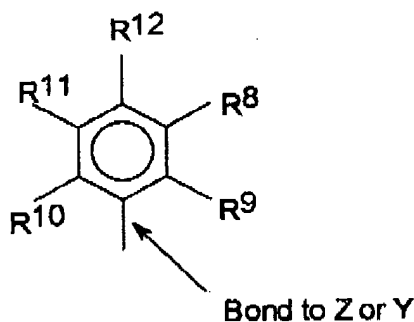
Y is a Group 15 element,

Z is a Group 15 element,

R¹ and R² are independently a C₁ to C₂₀ hydrocarbon group, or a heteroatom containing group having up to twenty carbon atoms, the heteroatom

Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006

selected from the group consisting of silicon, germanium, tin, lead, and phosphorus; wherein optionally, R^1 and R^2 are interconnected to each other, and/or R^4 and R^5 may be interconnected to each other, R^3 is absent, a hydrocarbon group, a hydrogen, a halogen, or a heteroatom containing group, wherein R^4 and R^5 are represented by the formula



wherein R^8 to R^{12} are each independently hydrogen, a C_1 to C_{40} alkyl group, a halide, a heteroatom, a heteroatom containing group containing up to 40 carbon atoms, wherein any two R groups may form a cyclic group and/or a heterocyclic group, and wherein the cyclic groups may be aromatic, and R^6 and R^7 are independently absent, hydrogen, an alkyl group, halogen, heteroatom or a hydrocarbonyl group; and wherein a polyolefin is produced; and wherein the melt index (I_2) of the polyolefin is changed by altering the amount of the second catalyst component relative to the amount of the first catalyst component.

33. (New) The process of claim 9, wherein said process further comprises producing a polymer from said polymerization of olefin(s), said polymer comprising an ethylene polymer or copolymer comprising a residual metal content of 5.0 ppm

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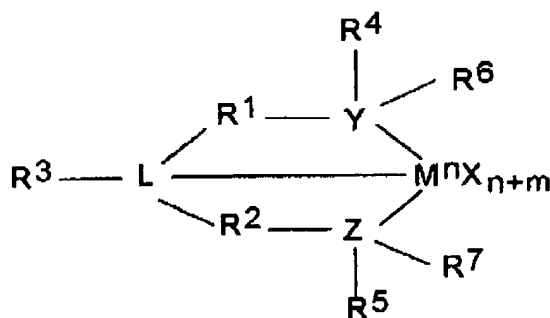
Application No.: 10/761,101

Response dated: March 30, 2006

Reply to Office Action: February 2, 2006

zirconium or less, an I_2 of from 0.01 to 10 dg/min., an I_{21} of from 1 to 10 dg/min., a density from 0.930 to 0.970 g/cm³, Mw/Mn of between 20 and 60, and a I_{21}/I_2 greater than or equal to 80.

34. (New) A process for polymerizing olefin(s) comprising, combining said olefin(s), a catalyst composition having a first catalyst component and a second catalyst component, wherein said first catalyst component is represented by the formulae:



where M is zirconium, each X is independently an alkyl leaving group, n is the oxidation state of M,

m is the formal charge of the ligand comprising Y, Z and L,

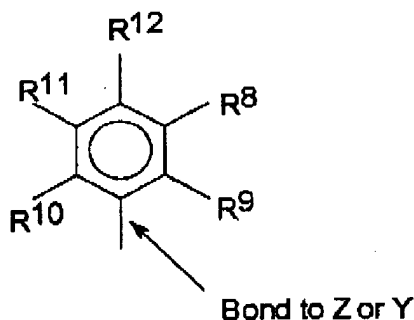
L, Y and Z are nitrogen,

R^1 and R^2 are independently $-\text{CH}_2-\text{CH}_2-$,

R^3 is hydrogen,

wherein R^4 and R^5 are represented by the formula

Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006



wherein
 R⁸ to R¹² are methyl groups;

R⁶ and R⁷ are absent;

wherein the second catalyst component comprises a metallocene compound of the general formula:



where M is a Group 4, 5, or 6 metal atom; L^A and L^B comprise unsubstituted or substituted, cyclopentadienyl ligands or cyclopentadienyl-type ligands, heteroatom substituted and/or heteroatom containing cyclopentadienyl ligands bonded to M, L^A and L^B may be the same or different, L^A and L^B are each bonded to M; Q is a monoanionic ligand, n is 0, 1 or 2, such that formula (III) represents a neutral metallocene catalyst compound;

wherein said process further comprises combining said first and said second catalyst components, a support, and alumoxane;

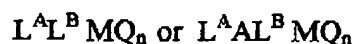
wherein said first catalyst component and said second catalyst component are added to a polymerization reactor in one of a slurry, a dispersion or a suspension;

wherein said olefin(s) comprise one or more of ethylene, butene-1, hexene-1, octene-1, or combinations thereof, wherein the mole ratio of comonomer to

Application No.: 10/761,101
 Response dated: March 30, 2006
 Reply to Office Action: February 2, 2006

ethylene, C_x/C_2 , where C_x is the amount of comonomer and C_2 is the amount of ethylene, is between 0.002 to 0.008; and
 wherein said process further comprises producing a polymer from said polymerization of olefin(s), said polymer comprising an ethylene polymer or copolymer comprising a residual metal content of 5.0 ppm zirconium or less, an I_2 of from 0.01 to 10 dg/min., an I_{21} of from 1 to 10 dg/min., a density from 0.930 to 0.970 g/cm³, Mw/Mn of between 20 and 60, and a I_{21}/I_2 greater than or equal to 80.

35. (New) A process for polymerizing olefin(s) comprising, combining said olefin(s), a catalyst composition having a first catalyst component comprising a Group 15 containing tridentate ligated Group 3-7 metal compound wherein the Group 3-7 metal atom is bound to at least one leaving group and to at least two Group 15 atoms, and wherein at least one of the at least two Group 15 atoms is bound to a group 15 or 16 atom through a bridging group; a support, and a second catalyst component, said second catalyst component comprising a metallocene compound, wherein said metallocene compound is represented by the formula:



wherein M is a Group 4, 5 or 6 metal atom;

L^A and L^B are selected from the group consisting of cyclopentadienyl, tetrahydroindenyl, indenyl, fluorenyl, and substituted versions thereof, L^A and L^B are each bonded to M;

Q is a monoanionic leaving group;

A is a divalent bridging group containing at least one Group 13 to Group 16 atom;
 n is 0, 1 or 2,

wherein said process further comprises combining an activator selected from alumoxane, a modified alumoxane, non-coordinating ionic activators, non-coordinating neutral activators, and combinations thereof; and